D2002-027

Attachment E - Varian Medical Systems Disclosure of Invention

Disclosure of Invention

VARIAN medical systems

RECEIVED JUL 23 2002 LEGAL DEPARTMENT

This is an important legal document. See definitions of asterisked terms. The form should be carefully completed by inventor(s) with the appropriate copies forwarded to the Patent Representative.

1* Descriptive Title of Invention: Reducing Dark Current Of Photoconductors Using Heterojunctions That Maintain High X-ray Sensitivity

List all inventors, include full middle names. Use attached sheet if more than one inventor.

2* Name & Title of Inventor(s)	Badge #	Home Tele phone#	Country of Citizenship
Larry Partain, Advanced Tech Mgr	38590	650-941-7531	USA

Home Address/Street	City	State	Zip
590 Milverton Road	Los Altos	CA	94022

3* Business Unit Name Ginzton Technology Center	Business Unit Address 2599 Garcia, Mountain View, CA 94043

4* Stage of Development(*see definitions)

	Date (Mo/Yr)	Location	Identify Persons or Supporting acts Stated in 4.A-E
A. First sketch or drawing			
B. First disclosure to others			
C. First written description			
D. Completion of first model or full size device			
E. first actual reduction to practice*			

5* List project # and other pertinent notebook entries, photographs, reports, drawings VIP Project AH109341

6* If the invention was disclosed outside of Varian, identify the individuals, the companies or activities they represent, and the date of disclosure. Under NDA to Kanai Shah, Paul Bennett & Mike Squillante of RMD on June 27, 2002

7* List any known public use, publication, or oral presentation of the invention, sale or offer for sale(*see definitions)

		No	Yes	Date	Persons, Companies or Pub
A.	Sold				
B.	Offered for Sale as part of a Product*				
C.	Offered for Sale in development program*				
D.	Described in Publication*				
E.	Submitted to Publication				
F.	Placed in public use*				
G.	Used in a product in public use				
H.	Orally presented				

8* List dates and details of activities of 7.A-H if scheduled in future

9* Related Government Contract(s). Did your job assignments involve work under a Government contract related to the inventive subject matter at the time the invention was...

	No	Yes	Contract No.
Conceived	☐	☐	
First successfully tested	☐	☐	

10* See page 2 (Section 10 Instructions) The completed description should be signed by the inventor(s), and then read and signed by a technically competent witness, using the statement 'DISCLOSED TO AN UNDERSTOOD BY ME THIS _____DAY_____OF_____, 20____." Drawings, sketches, photographs, reports, if available, may for a part of the disclosure, and reference thereto can be made to complete this description.

11* Recommended Security Classification of the invention

☐ Unclassified ☐ Confidential ☐ Secret ☐ Other _____

12* Signature(s) of Inventor(s)	Date	Signature of Witness	Date
Larry Partain	7/23/02	Andrew Jenny	7/23/02
Signature(s) of Inventor(s)	Date	Signature of Witness	Date

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Name & Title of Inventor(s)	Badge #	Home Tele phone#	Country of Citizenship
Mike Green MICHAEL CURZON GREEN (SENIOR SCIENTIST)	20193	650.856 USA 7921	U.K.

Home Address/Street	City	State	Zip
4055 MANZANA LANE,	PALO ALTO	CA	94306

3. Business Unit Name Ginzton Technology Center | Business Unit Address 2599 Garcia, Mountain View, CA 94043

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MC Green	7.23.02	Andrew Jenny	7/23/02
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Name & Title of Inventor(s)	Badge #	Home Tele phone#	Country of Citizenship
Steve Bandy	01793	USA 408 7324505	U.S.

Home Address/Street	City	State	Zip
590 Middlebury Dr.	Sunnyvale	CA	94087

3. Business Unit Name Ginzton Technology Center | Business Unit Address 2599 Garcia, Mountain View, CA 94043

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Name & Title of Inventor(s)	Badge#	Home Tele phone#	Country of Citizenship
George Zentai	30811	650 559 USA 8555	HUNGARY

Home Address/Street	City	State	Zip
1054 Blackfield Way	Mountain View	CA	94040

3 Business Unit Name Ginzton Technology Center | Business Unit Address 2599 Garcia, Mountain View, CA 94043

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Signature(s) of Inventor(s)	Date	Signature of Witness	Date
G. Zentai	7/23/02	Andrew Jeung	7/23/02
Signature(s) of Inventor(s)	Date	Signature of Witness	Date

Reducing Dark Current Of Photoconductors Using Heterojuctions That Maintain High X-ray Sensitivity

Patent Disclosure

Inventors:

Mike Green, Steve Bandy,
George Zentai & Larry Partain
Varian Medical Systems

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ginzton technology center

Varian Confidential

Date: 7/23/02 Inventors: Larry Partain Steve Bandy Michael C. Green

Read & Understood: Andrew Jeung Date: 7/23/02

Invention Summary

- Dark current limits the usefulness of high X-ray sensitivity of photoconductor sensors. This dark current can be substantially reduced by using p/n heterostructures of photoconductors without the loss of their high sensitivity.

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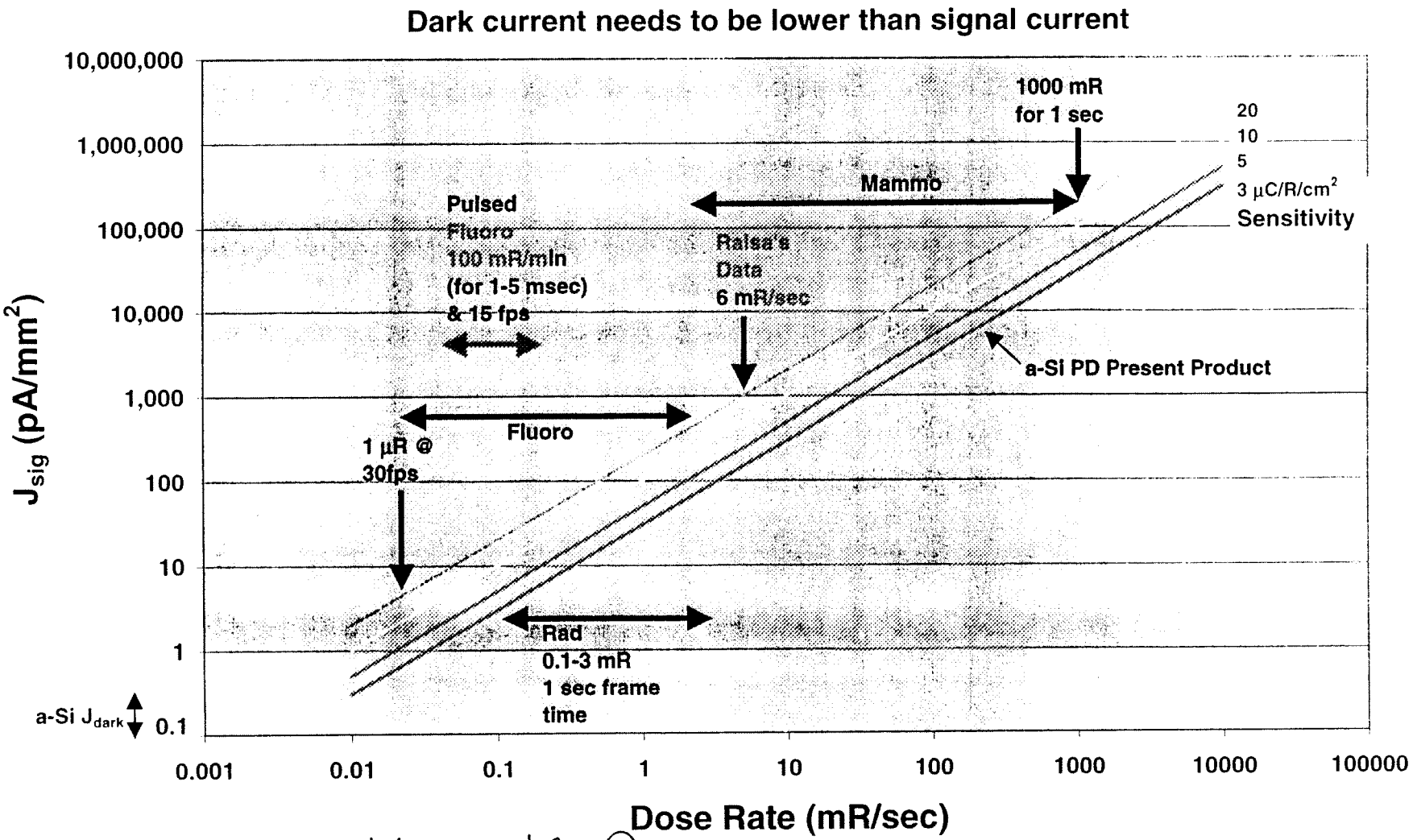
Date: 7/23/02 Inventors: Larry Partain Steven Boundy

Read & Understood: Andrew Jeung Date: 7/23/01

PC Signal Current Vs Dose Rate



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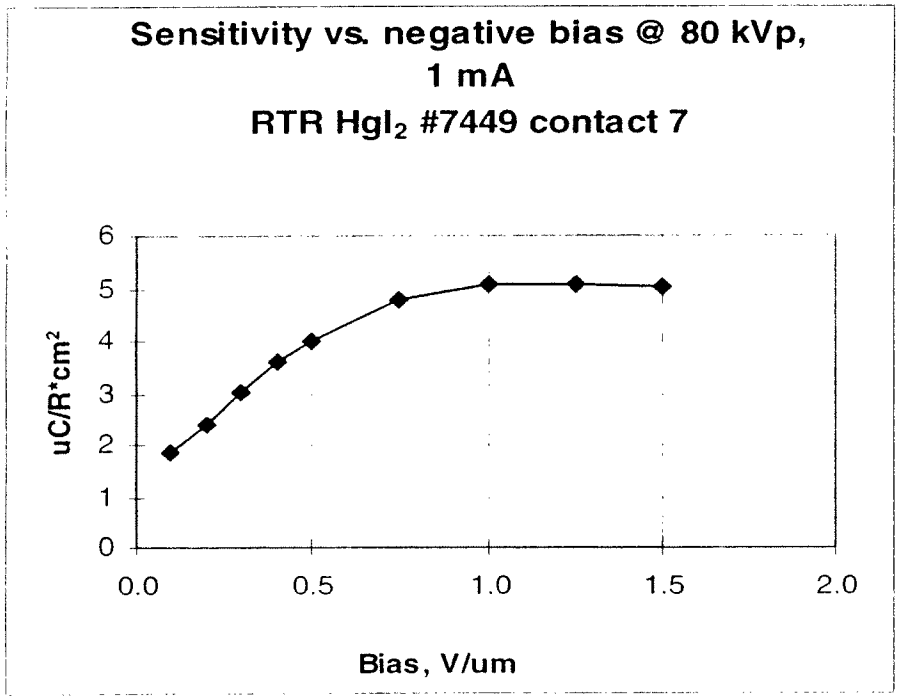
Date: 7/23/02 Inventors: Larry Partain, Michael C. Green, J. Eberhard

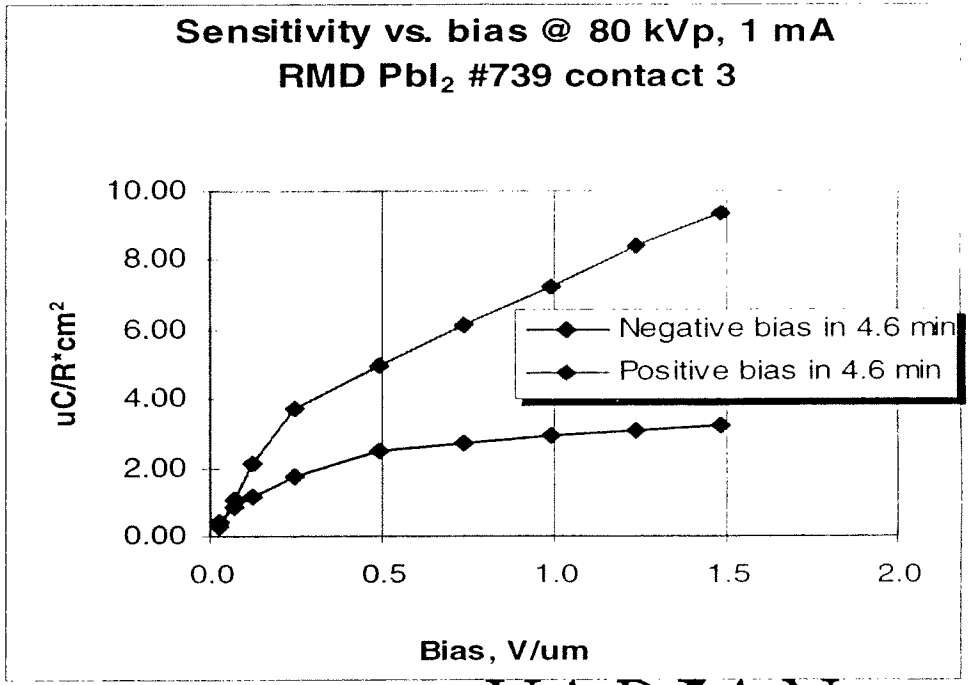
Read & Understood: Andrew Jeung Date: 7/23/02

Good Sensitivity Requires Bias Of ~ 0.5 - 1 V/µm

HgI_2



PbI_2



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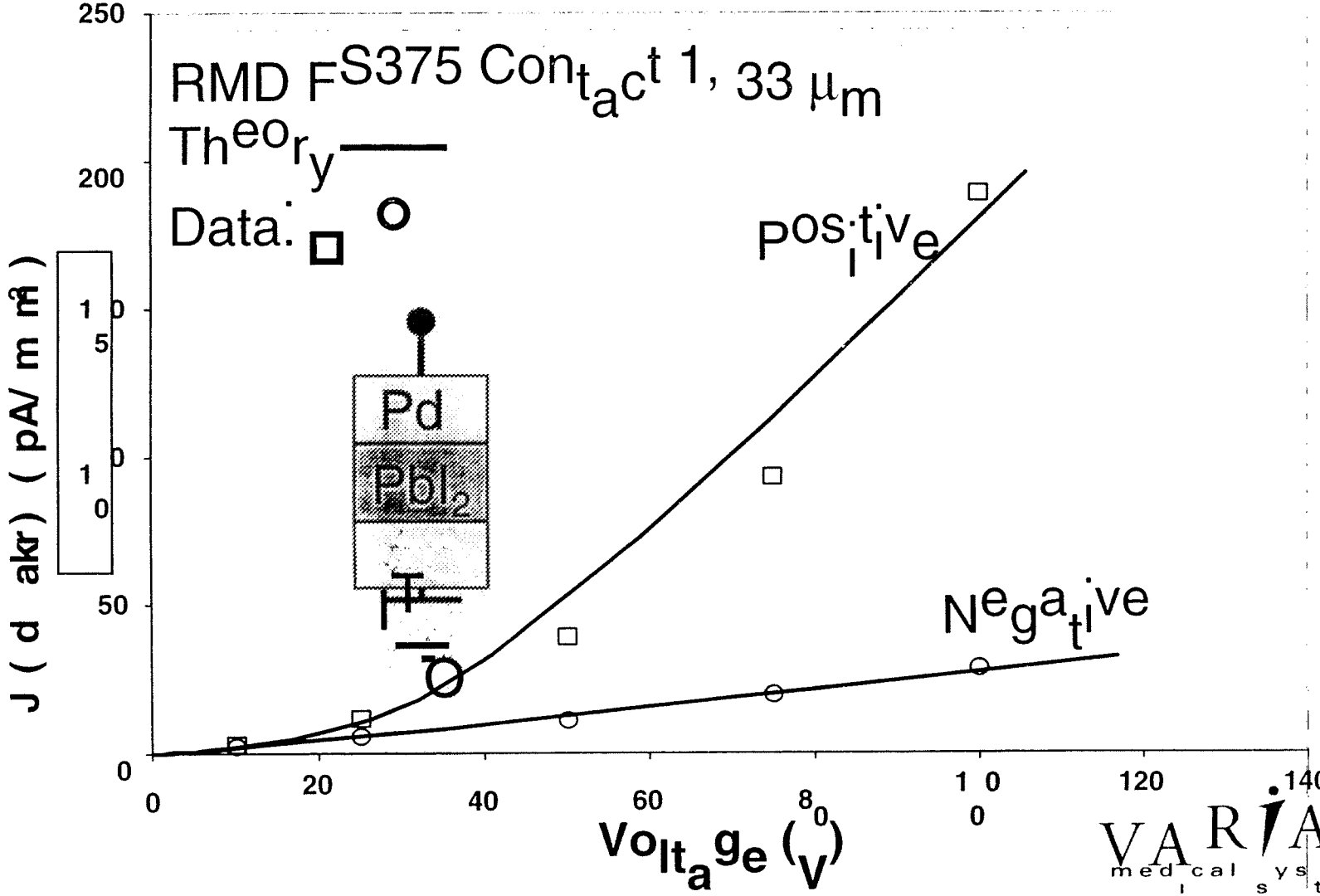
Date: 7/23/01 Inventors: Lan Parta

Read & Understood: Andrew Jeung Date: 7/23/01

PbI_2 Dark Current



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Date: 7/23/02 Inventors:

Read & Understood. Date: 7/23/02

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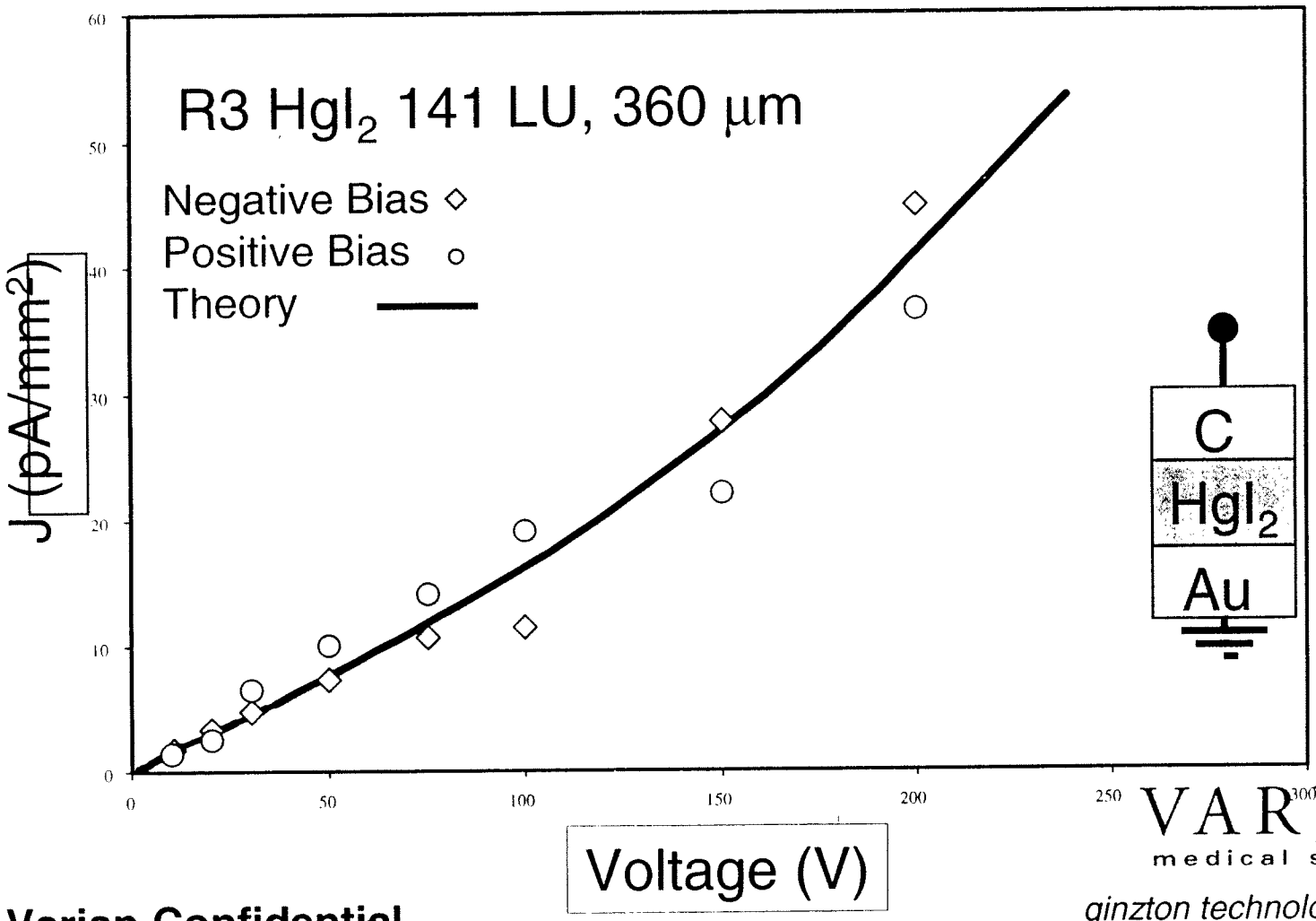
HgI_2 Dark Current



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Date: 7/23/02 Inventors: Larry Antonuk

Read & Understood: Andrew Jamy Date: 7/23/02

Dark Current Limits

$E = \rho J$

For $E = 1\ V/\mu m$ and $J_{dark} = 1\ pA/mm^2$

$\rho = 10^{14}$ Ohm-cm (Desired thin film value)

$\rho = 10^{12}$ Ohm-cm a-Si
$= 10^{12}$ Ohm-cm Se
$= 10^{12}$ Ohm-cm PbI_2
$= 10^{13}$ Ohm-cm HgI_2 $>$ Single Crystal Values

Polycrystalline thin films ρ unlikely to exceed single crystal values

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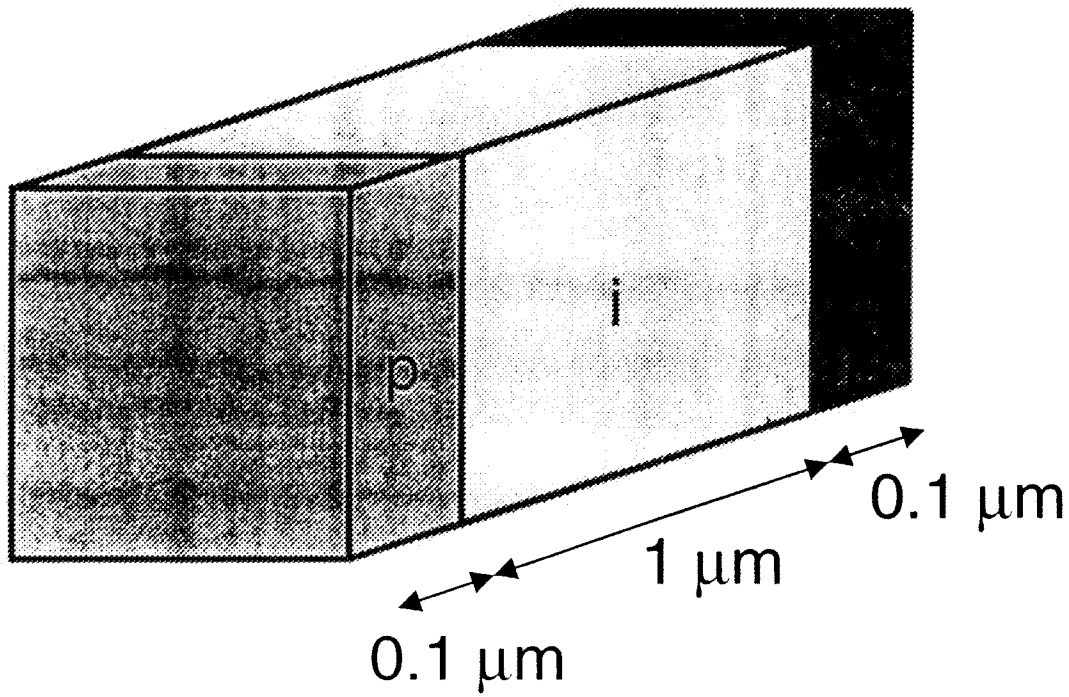
Date: 7/23/02 Inventors: Larry Partain, Michael C. Green

Read & Understood: Andrew Jeung Date: 7/23/02

Low Dark Current In a-Si Sensor Arrays



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Date: 7/23/02 Inventors: Larry Partain

Read & Understood: Andrew Jeung Date: 7/23/02

Heterojunction Structures

- Past experience
  - 1.2 eV p-Cu_2S/2.4 eV n-CdS (0.1-0.3 μm/30 μm)
  - Cu compensates "i" region in CdS (~1 μm)
  - High rectification ratio
  - Good "photodiode"
  - 10% efficient solar cell

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Date: 7/23/02 Inventors:

Read & Understood: Date: 7/23/02

Proposed Heterojunction Structures

- 2.3 eV p-PbI_2/2.1 eV n-HgI_2 (sublimated last)
  - Thickness combinations
    - Thick/Thin (e.g. 200 µm/50 µm)
    - Medium/Medium (e.g. 150 µm/350 µm)
    - Thin/Thick (e.g. 40 µm/350 µm or 10 µm/450 µm)
- 1.7 eV n-a-Si/2.3 eV p-PbI_2 (e.g. ~0.1 µm/200 µm)
- 1.7 eV p-a-Si/2.3 eV n-HgI_2 (e.g. ~0.1 µm/350 µm)
- Another Variation with a-Si
  - [illegible]

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Date: 7/23/02 Inventors: [signature] [signature]

Read & Understood: [signature] Date: 7/23/02

Combine With Insulator Layers (or Insulator Alone)

- SiO_2
- $SiO_{2-x}N_x$
- Formed by dpix before photoconductor deposition
- Several 100 Angstroms thick

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Date: 7/2/02 Inventors: [signature] Read & Understood [signature] Date: 7/23/02